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NOTES AND COMMENTS.

DROUGHT FIRES.

If sins and errors could be classed according to the risk of their natural penalties, the folly of forest destruction would probably head the list. Spring floods, summer droughts, sandstorms, and insect plagues, all nearly exclusively due to the reckless waste of arboreal vegetation, have turned the garden land of the Old World into hopeless deserts, and the inland regions of our own continent are threatened with the additional horror of yearly drought conflagrations.

Two hundred years ago these visitations were known only in the form of prairie fires. The aborigines of the Western forest States took no special precautions against the spread of their campfire blazes, and, indeed, often burned out the dry leaves of an entire mountain range to facilitate the search for nuts, but the forests were protected by the perennial moisture of their own atmosphere. In the Tennessee highlands, where I passed the summers of fifteen successive years on the comparatively dry ridge of the Chilhowee Range, I have seen the traces of nut-fires that had spread over a thousand acres of ground without causing a thousand cents' worth of actual damage. They had consumed the dry leaves, windfalls of dry twigs and mountain grasses (that could be relied upon to sprout up the next spring none the worse for the sprinkling of fertilizing ashes); here and there an old stump had been set a-fire, and in October bunches of pine knots could sometimes be seen flickering for days together, but the live trees had resisted the blaze, and the bushes were only singed or smoke-blackened to the edge of their sappy branches. After the lapse of six months the appreciable vestiges of injury might have been summed up in the retarded growth of a few whortleberry patches. Far different results are apt to follow the spread of a campfire in woodlands devastated by the activity of the lumber fiends. In Michigan, western Pennsylvania, western New York, Minnesota, and Wisconsin the tall trees of districts measured by hundreds of square miles have been felled and their dead branches scattered along the ground, together with dry leaves and chips of resinous wood. After the end of July the air currents reaching these half-cleared backwoods from the west are generally as dry as the breath of the Lybian Desert, and the moisture of the breezes from the east and south, too, has been absorbed by their passage over vast areas of parched hills and cotton-fields. By the middle of August the appearance of the vegetation resembles that of the Australian bushlands after a rainless summer. The foliage of the brushwood, no longer protected by the canopy of leafy trees, becomes yellow, then yellowish brown, and as dry as sun-heat and drought winds can make it. The facilities of combustion resemble those of a wrecked match factory, exposed to the glare of a furnace-fire.

In dry seasons effective precautions against the risk of a devouring conflagration become more and more difficult, and at last practically hopeless. The fatal spark may come from the engine of a passing train, from a smouldering cigar, from a bivouac of tramps or berry-gatherers. The mere love of mischief may prompt a schoolboy to celebrate his summer vacations with wood fireworks. An acre of burning weeds may escape detection till the flames have reached the brushwood piles, where resinous twigs and dry pine leaves flare up like gunpowder cotton, and within three hours after the rise of the first whirl of warning smoke the fire may have attained a rate of progress defying the control of anything short of a cloudburst. In a dead calm, a conflagration of that sort might "burn itself out" on a limited area, bordered by creeks or sand-roads; but experience has established the curious fact that a drought conflagration nearly always generates its own gales. The superheated air ascends and creates a vacuum, which is filled up by air currents rushing in from all sides with a violence proportioned to the difference of atmospheric pressure. Borne on the wings of those whirlstorms, showers of sparks are scattered in all directions, and overleap obstacles that would have stopped the flight of a feathered arrow. The citizens of Hinckley, Minn., had surrounded their little town with a "fire ring" nearly one hundred yards wide, by burning or sweeping out every wisp of combustible substance; but they might as well have opposed their brooms to the cannonade of a shell battery. An eyewitness' report says:

"About three o'clock in the afternoon the fire literally jumped into the town. Its approach was not gradual. It did not cut its way along, devouring everything in its path, but came on in huge leaps, as if to overtake everything fleeing before it, and then burn back at its leisure. The intense heat had developed a veritable whirlwind of flame that actually twisted off poplar trees several inches in thickness, and gathering huge blazing firebrands high in the air and carrying them forward from forty to eighty rods, there to fall and recommence the work of devastation."

The vehemence of that fire-tornado may be inferred from the fact that it overtook a swift-running passenger train of the St. Paul & Duluth Railway on the down grade to Mink Lake. Seeing the track crowded with refugees, the engineer stopped his train and took aboard about forty men and thirty women and children, with such bundles of household goods as they had been able to gather up in their hasty flight. By that time the horizon ahead was a sea of raging flames, and, after a hurried consultation with the conductor and express messenger, the engineer decided to turn back and try to regain the safe meadow lands of the lakeshore. But the cinder-storm was close at his heels. To the left and right of the track the woods caught fire, and a flame-wind that would have made a gust of an African simoom a blest relief almost took away the breath of the devoted crew and blistered their arms through their drenched shirts. A fireman extinguished his blazing clothes by leaping bodily into the watertank, and then seizing a bucket dashed it several times over the blazing engineer. The train was running under a full head of steam, but the cinder brands flew ahead of it, and the conductor estimates the speed of the pursuing storm at sixty miles an hour. Hot air, almost deprived of its oxygen, affects the brain like a narcotic poison, and when the cars themselves caught fire the passengers, already frenzied with fear, seemed to lose their wits altogether, and some of them actually leaped into the midst of the flames.

The voice of the flame-tornado out-roared the clatter of the train, and the horrors of the next ten minutes must have rivalled the scenes on board

of the Chilian supply-train that had to run the gauntlet of the rebel sharpshooters. A burning bridge crunched and swayed as the locomotive rushed across, but the engineer stuck to his post till he was stopped by a chasm sixty feet wide and filled with the debris of a trestle across a little lake that proved the salvation of the half-roasted passengers. The train, tank-car and all, was burned to the trucks of the wheels. If the breath of that gale could burn its way through a water-tank, it is no wonder that the few remaining copses of greenwood failed to resist the havoc. Like the Chicago monster fire, the conflagration prepared its own fuel; for the spark-whirls parched the foliage the succeeding flames were to devour; and four miles north of Hinckley two hundred persons were burned in a swamp, where they had taken refuge in the hope that the rank vegetation would stop the progress of the fire. Fifty persons were burned with their houses at Sandstone, Minn., twenty at Kettle River, thirty at Rutledge and Pine-town, along the line of the Minnesota Southern Railroad, and, altogether, some five hundred human beings may have perished in a single forest fire—perhaps not the worst, and certainly not the last, of the present summer.

The only remedy against the repetition of such horrors can be found in precautions against the wholesale destruction of woodlands, and especially in the "isolation system" of the north European foresters. Instead of being allowed to sell large tracts of forests, to be devastated at the pleasure of greedy speculators, the proprietors of wooded districts are required by law to spare the *hoch-wald* ("high woods") of all mountain ridges too steep for the successful pursuit of agriculture, and utilize the forests of the plains in rotation, sparing the trees of certain sections till the saplings of the adjoining (cleared and replanted) areas have time to grow up, and taking care that each new clearing shall be surrounded by a broad belt of flame-resisting greenwoods. By the strict enforcement of that regulation and the careful removal of brushwood piles, the spread of forest fires has been almost entirely obviated even in countries like eastern Prussia and the Austrian Alps, where sixty to eighty per cent. of considerable areas are still covered with stately pine forests.

That prevention, in such cases, is better, because far more practicable, than cure, has been only too dearly proved by the experience of the last fifteen years, but the necessity of legislative reform is rarely admitted till the significance of the danger is brought home, *in terrorem*, to the citizens of populous settlements like those of the Minnesota lakeshore counties, where the veil of the smoke-clouds almost turned day into night, and where the approach of the conflagration could be felt from a distance of fourteen miles, even in buildings protected against the drift of the cinder-showers.

Even now, the demand for a revision of our forest laws is only local; but we should remember that the same agencies that have modified the climatic conditions of the upper Mississippi Valley are at work throughout the territory of our Atlantic seaboard. A risk from which the happiest geographical position of any country on earth could not protect sea-girt Asia Minor is steadily increasing with the progress of aridity, and before the middle of the twentieth century the last remaining forest, or rather brushwood, reservation of east America—the upland region of the Appalachian mountain system—may be swept by a fire-storm from the sources of the Potomac to the rock gates of the Tennessee Valley.